



Energy Multiplier Module (EM²) Technical Fact Sheet

General Atomics is developing the Energy Multiplier Module (EM²), an economically-competitive approach to electricity generation that turns nuclear waste into energy, without chemical or separative reprocessing, and utilizes it through a closed-fuel cycle, sustainable for decades.

The U.S. has the equivalent of about 63,500 quads of potential energy in its inventory of used nuclear fuel, which is approximately 9 trillion barrels of oil, an amount equivalent to about 1,800 years at current oil consumption of 16 million barrels per day.

The nuclear industry is currently using only ~0.5% of the available energy from mined uranium. The rest accumulates in large stores of depleted uranium (DU) and used nuclear fuel.

The EM² is a modified version of General Atomics' high-temperature, helium-cooled reactor and is capable of converting used nuclear fuel into electricity and industrial process heat, without conventional reprocessing. Each module would produce about 240 MWe of power at 850°C.

The initial "starter" section of the core provides the neutrons required to convert used nuclear fuel or DU into burnable fissile fuel. First generation EM² uranium starters (~12% U²³⁵) initiate the conversion process. The starter U²³⁵ is consumed as the used nuclear fuel/DU is converted to fissile fuel. The core life expectancy is ~30 years (using used nuclear fuel and DU) without refueling.

Substantial amounts of valuable fissile material remain in the core. This material is reused as the starter for a second generation of EM²s, without conventional reprocessing. There is no separation of individual heavy metals required and no enrichment needed. Only unusable fission products would be removed and stored. This means that all EM² heavy metal discharges could be recycled into new EM² reactors, effectively closing the nuclear fuel cycle. Thus, reducing the need for long-term repositories and minimizing proliferation risks.

The current amount of used nuclear fuel waste in storage at U.S. nuclear plants is sufficient for 3,000 modules. The amount of available DU material in storage is sufficient for 30,000 modules. In an EM² fuel cycle, this material can satisfy U.S. energy demands for centuries. 400 modules could satisfy approximately 100% of the current U.S. electricity output of nuclear reactors. Current used nuclear fuel could be removed from utility sites and be processed into EM²s.

